



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/773,796	02/06/2004	Vijayen Veerasamy	014089-002580US	8456

20350 7590 07/21/2006

TOWNSEND AND TOWNSEND AND CREW, LLP
TWO EMBARCADERO CENTER
EIGHTH FLOOR
SAN FRANCISCO, CA 94111-3834

EXAMINER

PADGETT, MARIANNE L

ART UNIT PAPER NUMBER

1762

DATE MAILED: 07/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary*Supplemental*

Application No.

10/773,796

Applicant(s)

VEERASAMY ET AL.

Examiner

Marianne L. Padgett

Art Unit

1762

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3-5, 7-11 and 16-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7-11, 18, 21 and 22 is/are allowed.
- 6) ☒ Claim(s) 3-5, 16-17, 19-20, 23-40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 1762

1. This supplemental action updates the action mailed 7/6/2006 to show the approval of the terminal disclaimer of 6/1/2006, plus some corrections of "typographical" errors, thus repeats the pertinent rejections of the 7/6/2006 action. Note correction of section 7 to include claims 23-24 in the rejected claims listing, which is consistent with the previous cover sheet and the first full paragraph on the previous actions' page 10.

2. Comments in sections 1 & 2 of the 7/6/2006 action remain pertinent, but are not repeated here.

3. Claims 25-27, 29 & 31-40 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

New claimed 31 (and its dependent claims) contain the newly claimed limitations of "narrow ion energy distribution and a narrow ion weight distribution", but no use of "narrow" was found in the original specification, hence no disclosure of what the range implied by "narrow" encompasses was found, so that this relative term encompasses New Matter for the ranges of ion energy distribution & ion weight distribution. It is noted that paragraph [0060], in reference to the insert in figure 3F states "that the ion energy distribution of the plasma beam is quite sharp, with a width of approximately 5% about the bias voltage. The sharpness apparently arises for at least two reasons...". While "narrow" and "quite sharp" are both relative terms having potentially overlapping scopes, they are not necessarily the same scopes, and only related to the energy. Furthermore, the particular example of "a width of approximately 5% about the bias voltage", as the illustrated energy distribution spectra, is for a particular plasma beam

Art Unit: 1762

(which is not specified, but the examiner suspects acetylene, given its use throughout the specification), thus the particular example cannot be properly said to provide definition for narrow, nor support for ion energy distributions for all plasma beams containing carbon ions from any material source. For these reasons independent claim 31, its dependent claims, and possibly new claims 25, 27 & 38, appear to contain New Matter.

Also in claim 31 (but not its dependent claim 34), the claimed subject matter appears to be broader than the scope of the enabling disclosure, as while there is extensive discussion, such as in paragraphs [0002] & [0005-12], of use for magnetic recording media, support for use on other "data recording substrates, as is more broadly claimed in the preamble of claim 31, which is inclusive of all sorts of data recording substrates, such as paper, etc., was not found, thus appears to encompass New Matter.

It is noted that part of the support for claims 26 & 37 may be found in paragraph number [0063], which discusses the ionic composition of a plasma beam produced using an acetylene source gas, where the mass spectra show the beams "are dominated by the $C_2H_2^+$ ion and other hydrocarbon ions having two carbon atoms, collectively referred to as the C_2 species. The next most significant ions are the C_4 species, which have been found to decrease in intensity as the pressure is lowered, being below 5% if the pressure is maintained below 5×10^{-5} mbar" (emphasis added). While there is support for a group of related dominant carbon ion species (C_2), there is not support for a single dominant carbon ion species as claimed, and the teaching provided in [0063] is ONLY directed to the use of acetylene gas. Furthermore, the claimed 5% of "non-dominant species of carbon ion", also does not appear to be directed to a single ion species, but a group thereof, i.e. C_4 , which while not defined appears from context to mean all

Art Unit: 1762

ion species having 4 carbons, and the claim percentage is further dependent on not just the source gas used, but also the pressure range under which the plasmas formed. For these reasons there is no evidence of support for these claimed proportions for two single species of carbon ions, for either the disclosed acetylene gas, or for the claimed limitation directed to all carbon-containing source materials.

Claims 26 & 37 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for ion species groups of C_2 & C_4 ions produced in an acetylene gas plasma at pressures below 5×10^{-5} mb, does not reasonably provide enablement for single dominant & single non-dominant carbon ion species, produced from any source material comprising carbon at any pressure. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to use the invention commensurate in scope with these claims. See above.

Claims 29 & 39, appear to encompass new matter as the claim of "a Raman G peak below about 1510 cm^{-1} ", was not found to be disclosed in the scope claimed, however paragraphs [0101-102] & table 2 have values near the higher in point of this range, with the lowest value being 1494 cm^{-1} , which is significantly above the open ended range that must be considered to go down to zero as claimed.

4. Claims 25, 27, 28, 31-35 & 38-40 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 28 & 32, it is uncertain what is meant by "subplantation", which was found used in paragraphs [0015] & [0064] in the specification, however was not defined or explained.

Art Unit: 1762

It is noted that it is stated with respect to the C-C sp^3 bond formation, that "subplantation affect may only be significant if sufficient ions are present in the particle stream", and that considering the prefix "sub-", the literal meaning of the term appears to potentially be equivalent to --implantation--, hence in the given context "subplantation" will be considered to be equivalent to "implantation" for purposes of examination, unless a relevant prior art definition stating otherwise is supplied.

Use of relative terms is vague and indefinite unless a definition defining its scope is in the claim, or in a clear definition in the specification or in provided relevant prior art. In new claim 31, the modifier "narrow" describing both the "ion energy distribution" and the "ion weight distribution" is a relative term, that was not even found in the body of the specification or original claims, hence has no clear scope.

Claims 25, 27, 35 & 38 are vague and indefinite, because it is unclear how "a bias voltage" relates to the claimed process, which does not require, as written, any bias voltage to be used in any part of the process or be applied to any material or thing mentioned in the independent claims, such that the width of the impact energy distribution defined by these claims is unclear, or undeterminable.

Claims 30 & 40 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

While table II & paragraph [0102] discuss a "plasmon peak", the examiner does not understand the significance/meaning of this feature as described therein with respect to the

Art Unit: 1762

claimed deposit, hence this teaching does not enable her to evaluate the claimed meaning. As it is apparent that it has some meaning that is important to the applicants, clarification of this issue/subject is desired so that a meaningful evaluation can be made.

5. With respect to previously applied art, while Rabalais et al. (5,374,318) would have substantially uniform ion weight and energy distributions as claimed, this is produced by a mass selection technique that employs quadruple focusing techniques and the absence of a straight through path to eliminate various species from the beam, this uses a different technique than the claimed process, which requires a straight path, hence clarifications in the claim language have removed the 102 rejection over were Rabalais et al.

6. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

Art Unit: 1762

such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 3-5, 16-17, 20, 23-24, 29-30 & 37-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baldwin et al. (5,616,179), previously discussed in sections 12 & 8 of the actions mailed 3/29/2005 & 11/16/2005, respectively.

Baldwin et al. (5,616,179) teaches an end-Hall ion source, with a straight path from source to substrate (figures 1 & 2), the teaching therein (some cited by applicant on page 9 of their 6/1/2006 response) on col. 3, line 65-col. 4, line 12 and col. 6, lines 31- 52, indicate that most species emitted by the end-Hall ion source will traverse the distance from the source to the substrate, without making any gas phase collisions involving subsequent energy loss. While it is indicated on col. 6 that when methane gas is used, all the ion species are not carbon containing and some H^+ & H_2^+ will be produced, as seen on col. 4, lines 13-23, methane is not the only hydrocarbon contemplated for use by Baldwin et al., but alternate hydrocarbons, such as acetylene are also contemplated. From Baldwin et al.'s comments, it appears expected that "all the ion current was assumed to be carbon containing" for such alternatives, thus would inherently have a narrower & more uniform ion species distribution when using taught gases, such as

Art Unit: 1762

acetylene. Note that Baldwin et al.'s teachings when discussing most species emitted from their ion source that are arriving at the substrate, are including neutral species, nonionized radicals, etc., as being important to the formation of their a-C:H deposition, however applicants' claims while limiting parameters concerning the ions in the stream from the plasma, do not exclude the presence of these neutral species, etc., since they are not ions, but may come from a plasma.

While Baldwin et al. indicates that the various neutral species are important in the formation of the deposit, the teachings also indicate that the positive ion hydrocarbon species are also important, hence they must be said to promote the formation of the a-C:H deposition.

Applicants' claims do not prohibit or exclude other influences from contributing to the formation of the claimed sp^3 C-C bonds, they merely require that "the substantially uniform impact energy distribution and the substantially uniform weight distributions promote formation" thereof. It would appear from the teachings of Baldwin et al. that when hydrocarbons, such as acetylene, which can be assumed to have all ion species being carbon-containing, that they would correspond to a substantially uniform weight distribution as claimed and would be affecting, hence promoting formation of sp^3 carbon-carbon bonds.

(Note the mentioned "broad beam" irradiation cited by applicant in column 9, is an optionally supplied ion source using $Ar + N_2$, that is not the carbon ion source & used in an alternate mode process, hence is not relevant to the discussion.)

With respect to Baldwin et al.'s important feature of "2. The ranging energy distribution of the hydrocarbon-based positive ions in the beam", this statement does not tell what is meant by "ranging energy distribution", hence must be read in light of the rest of the disclosure in the patent, such as col. 4, line 53 that states "the ion beam energy is about 100 eV" or col. 5, line 17-

Art Unit: 1762

34 teaching "it is believed that when the average energy per deposition carbon atom is about 100 eV, then hard substantially optical transparent electrically resistive and non-electron-emissive a-C:H is produced. With the average energy per deposited carbon atom is about 50 eV, then softer...a-C:H is produced....one reason that V_{anode} values must be higher than expected is that there is a particular range of ion energies produced at any given V and that there are low energy, reacted neutral species present as well...", hence it is apparent that by choosing a particular energy in a range of energies for the positive ions one produces a-C:H depositions with different hardnesses, i.e. different sp^3 carbon-carbon bond percentages, where these energy distributions centered around the exemplary 100 eV energies for the deposited carbon atoms, i.e. impact energies, clearly are promoting the claimed bond structures and appear to be sufficiently uniform within the context claimed. Note at taught energies ion implanting mechanisms would have been expected to be involved during the coating process, especially as the thickness of the coating increased.

With respect to the specifically claimed with of the energy distribution being "approximately 5% sign of a bias voltage", it is noted that average energy is related to their V_{anode} , hence may be considered related to some sort of bias voltage, although the percentage cannot be determined from the given information, but presently as claimed applicant's limitation is not clearly related to the process, thus is not presently meaningful. With respect to the claim of "a dominant species of carbon ion and a non-dominant species of carbon ion", there will inherently be in any plasma, species that have higher percentages (i.e. can be called dominant species) and those with lower percentages, and at least some or one of the carbon ion species of Baldwin et al.'s plasmas, such as those employing acetylene, would be at or below 5%. Note that

Art Unit: 1762

the "comprises" language does not limit how many dominate & non-dominant species are present, such that these claims are not considered to distinguish over Baldwin et al.

Applicants' point (page 9 of 6/1/2006 response) about Baldwin et al.'s use of hydrogen to prevent formation of graphite like carbon bonds, is not considered to effect the relevance of the Baldwin et al. reference, because applicants' claims do not exclude the use of hydrogen or the effects thereof taught in Baldwin et al., particularly noting applicants' paragraph [0016], which includes the presence of hydrogen in the ion stream or the deposited coating. Furthermore, Baldwin et al. has input of hydrogen gas into the chamber (not into the ion source) for their use in preventing graphite-like chemical bonds (col. 9, lines 53-56), thus is not affecting the emissions from the ion stream, hence is neither included nor excluded by applicant's claim language.

While Baldwin et al. does not teach a particular percentage of sp^3 carbon-carbon bonds in their deposits, they do teach that a-C:H deposits contain sp^3 hybridization (col. 1, lines 58-col. 2, line 17, especially 5-10), and means of using the ion energy to effect the hardness, which one of ordinary skill in the art would recognize is affecting the percentage of sp^3 hybridization. Therefore, it would have been obvious to one of ordinary skill in the art to adjust their average ion energy in order to produce the hardness desired for the particular end use, where higher energies that are said to produce the harder films would have been expected to have had higher percentages, where routine experimentation would determine the energy to promote the desired degree of hardness/percentage of sp^3 hybridization, and thus would have been expected to encompass claimed values.

Note that Baldwin et al. teach that deposition rate (col. 5, lines 5-13) varies with distance between source and substrate providing examples above a deposition rate of 2000 Å/min (= 33 Å/sec) at a few centimeters distance with 500 Å /min (≈ 8.3 Å /sec).

As Baldwin et al. provide no spectra, i.e. no Raman spectra, or any other spectra the examiner cannot evaluate whether or not peaks, as in the new claims 29-30 & 39-40, are produced, as [0102] in the specification appears to indicate that a Raman spectra G-peak is related to the percentage of C-C sp^3 content of the film, it appears that G-peaks in the claimed range of 0-1510 cm^{-1} would have been expected to be present due to the presence of taught sp^3 hybridization as discussed above. The plasmon peak is discussed in the same paragraph, however the examiner cannot figure out from what is written there, how it relates to anything in the deposit.

8. Claims 19, 31-35 & 39-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baldwin et al. as applied to claims 3-5, 16-17, 20, 23-24, 29-30 & 37-38 above, and further in view of Rabalais et al. (5,374,318, previously discussed in sections 8-11 of the action mailed 3/29/2005).

While Baldwin et al. discusses desirable hard coding in optical properties of their diamondlike carbon deposits, they do not teach coating on a magnetic recording media, however the previously discussed secondary reference discusses the usefulness of such carbon deposits for optical coatings or protective coatings on magnetic recording media, etc. (col. 1, lines 19-48), thus motivating the specifically claimed end use as Rabalais et al. shows the desirability of properties as are produced in Baldwin et al. used on such substrates.

Art Unit: 1762

9. Lewin et al. (4486286) remains of interest for use of a remote plasma, with a weak magnetic field perpendicular to the beam direction, where the plasma is formed from acetylene gas (or other hydrocarbon gases, with preferably high carbon to hydrogen ratios), and where a plasma beam is formed via the use of an anode + grid structure to apparently extract ions, but the teachings therein provide little enlightenment concerning ion energy and ion weight distributions, however it is generally noted that higher energies increase hardness of coating.

10. The rejection of claims 3-5, 7-11, 16-22 & 31-40 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-23 of U.S. Patent No. 5,858,477 is removed by the approval of the TD that was supplied 6/1/2006 (approval on 7/14/2006, examiner notification received 7/18/2006).

11. Applicant's arguments filed 6/1/2006 and discussed above have been fully considered but they are not persuasive.

Applicant's arguments with respect to claims 25-28 & 31-40 have been considered but are moot in view of the new ground(s) of rejection.

Claims 7-11, 18 & 21-22 have now had all previous rejections overcome, hence appear to be allowable at this time.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marianne L. Padgett whose telephone number is (571) 272-1425. The examiner can normally be reached on M-F from about 8:30 a.m. to 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks, can be reached at (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Art Unit: 1762

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MLP/dictation software

7/18/2006

A handwritten signature in black ink, appearing to read "Marianne Padgett", written in a cursive style.

**MARIANNE PADGETT
PRIMARY EXAMINER**